

REAL TIME LASER SHOCK PEENING QUALITY ASSURANCE BY
NATURAL FREQUENCY ANALYSIS

ABSTRACT

A real time method for quality control testing of a laser shock peening process of production workpieces by analysis of natural frequency shifts during the laser shock peening process. One particular embodiment includes laser shock peening surface of the production workpiece by firing a plurality of laser beam pulses on the surface and forming a plurality of corresponding plasmas, each one of the plasmas pulses having a duration in which the plasma causes a region having deep compressive residual stresses to form beneath the surface, measuring at least one natural frequency of the workpiece for each of the laser beam pulses, calculating natural frequency shifts from a baseline natural frequency for the measured natural frequencies for at least a portion of the laser beam pulses, and using the natural frequency shifts for accepting or rejecting the workpiece with respect to pass or fail criteria.